REMARKS

This Amendment is in response to the Office Action mailed December 18, 2002. The Office Action rejected claims 1-43 under 35 USC § 102(b). Applicants have amended claim 1, 11, 12, 35, and 36. Claims 1-43 remain pending in the application. Reconsideration in light of the amendments and remarks made herein is respectfully requested.

Rejections Under 35 U.S.C. § 103

1. The Office Action rejected claims 1-43 under 35 U.S.C. § 102(b) as being anticipated by Ohnaka et al. ("*Ohnaka*") (U.S. Patent No. 5,144,633).

Applicants respectfully traverse the rejection in its entirety.

Applicants submit that Ohnaka does not teach or suggest the present invention. The Office Action states that 109 and 121 in the cited reference are current-blocking layers. However, this is incorrect. Layer 109 in the cited reference is a cladding layer (Col. 3, lines 51-54), and 121 is an opening (Col. 5, lines 3-7). Generally speaking, a cladding layer does not function to actively block electric current. It is therefore not possible to refer to the cladding layer 109 in the cited reference as a current-blocking layer like the one in the present invention.

The cited reference states that the cladding layer 109 is of p-type $Al_{0.7}Ga_{0.3}As$ of carrier concentration $1X10^{18}cm^{-3}$ (Col. 4, lines 59-60). This carrier concentration is the same as the carrier concentration of the current-blocking layer 107 of n-type GaAs (Col. 5, lines 9-10). It means that in the semiconductor laser in the cited reference, the carrier concentration of the current-blocking layer is homogeneous. Thus, the current-blocking layer in the cited reference does not have two or more regions having different concentrations of n-type carriers such as N1 and N2, as claimed in the present invention.

Furthermore, the invention recited in Claims 1-10, 15-34, and 37-41 has the characteristic of lowering the carrier concentration N1 in the region of the lower layer of the current-blocking layer than the carrier concentration N2 in the region of the upper layer. This novel arrangement was invented due to the recognition of the problem that the cladding base layer 5 suffers from etching because of thermal cleaning performed before forming the buried cladding layer 7. The cited reference does not teach or suggest this problem. The present claimed invention teaches how to prevent etching; this is not taught in the prior art. Consequently, Applicants submit that the invention recited in Claims 1-10, 15-34, and 37-41 is not taught or suggested by the cited reference.

In order to enhance the clarity of the claimed invention, independent claims 1, 11, 12, 25, 35, and 36 have been amended to recite the limitation that "the current-blocking layer (13) has a lower refractive index than the p-type cladding base layer (5) and the p-type buried cladding layer (7)". This amendment is based on the description found in the Specification of the present application (page 28, line 20 to page 29, line 3).

The semiconductor laser defined in Claim 1 of the present invention has novelty because the cited reference does not disclose that the current-blocking layer has at least two regions having different concentrations N1 and N2 of n-type carriers, and the carrier concentration N1 in the region of the lower layer is lower than the carrier concentration N2 in the region of the upper layer, all of which are the characteristics of the present invention. For the same reason, Applicants submit that Claims 2-10, 15-34, 37-41 also have novelty.

Additionally, the newly added element to independent Claims 1, 11, 12, 25, 35, and 36, "current-blocking layer (13) has a lower refractive index than the cladding base layer (5) and the

buried cladding layer (7)" is not taught or suggested by the cited reference. The cited reference merely discloses that the current-blocking layer 107 is of GaAs. It is generally known that using a blocking layer of GaAs causes an absorption loss. An absorption loss leads to increases of threshold current and operating current which would make it difficult to achieve the objects of the present invention (page 4, lines 15-21).

The present invention discloses that the current-blocking layer 13 (13a and 13b that are two regions having concentrations N1 and N2 of the n-type carriers) is of either AlInP or $(Al_xGa_{1-x})_{0.5}In_{0.5}P$ ($0.7<x<1$) which both have a lower refractive index than the cladding base layer (5) and the cladding layer (7) (Specification, page 28, line 24 to page 29, line 1, and page 34, lines 20-22), and thus no absorption loss is caused in the semiconductor laser of the present claimed invention. Accordingly, as shown in FIG. 3, it is possible to make the oscillation threshold current low and the output high in the semiconductor laser.

Because the cited reference does not teach or suggest defining the refractive index of the current-blocking layer as claimed, the semiconductor in Claims 1-43 of the present invention is patentably distinguishable over the cited reference.

Conclusion

In view of the amendments and remarks made above, it is respectfully submitted that the pending claims are in condition for allowance, and such action is respectfully solicited. Authorization is hereby given to charge our Deposit Account No. 19-2814 for any charges that may be due. Furthermore, if an extension is required, then Applicants hereby request such an extension.

Respectfully submitted,

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I hereby certify that this correspondence is being sent via Facsimile to (703) 872-9317 to the Assistant Commissioner for Patents, Washington, D.C. on April 24, 2003.

By: Dorothy L. Chambers

Signature

Dated: April 24, 2003

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